## REMARKS/ARGUMENTS

Claims 1-25 are pending in the application. Claims 1-3, 6-9, 13, 14, 15, 17, and 19-24 have been amended. Claim 25 has been newly added. Reconsideration is respectfully requested. Applicants submit that the pending claims 1-25 are patentable over the art of record and allowance is respectfully requested of claims 1-25.

Applicants would like to thank Examiner Divecha for holding a telephone interview with their representative on Wednesday, May 18, 2005, at 2:00 p.m. (EDT). During the telephone interview, proposed claim amendments to claim 1 were discussed and objections to the drawing were discussed. Examiner Divecha agreed to reconsider the rejections and objections, but no further agreement was reached.

The drawings are objected to under 37 C.F.R. 1.83(a). The Examiner indicates that the claimed subject matter and its limitation in claims 1, 9, and 15 must be shown or the feature(s) cancelled from the claim(s). Applicants respectfully traverse. Applicants would also like to thank the Examiner for indicating, during a telephone interview, that he would reconsider the objection to the drawings.

For example, claim 1 describes at least a first host digital data processor of the one or more host digital data processors in communication access with at least a first one of the plurality of storage devices, the first host digital data processor having a file system that effects access to that storage device, which is shown, for example, in Figure 1 by hosts 12a, 12b, 12c that are in communication with storage devices 14a, 14b, 14c. Also, the Specification, for example, at page 2, lines 2-3 describes "host digital data processors". The first host digital data processor is associated with a lower capacity bound and an upper capacity bound for storage devices added to extend the file system. The lower capacity bound describes a minimum available storage capacity of the storage devices and the upper capacity bound describes a maximum available storage capacity of the storage devices, which is shown, for example, by Figures 1 and 27 and Applicants' Specification, page 121, lines 1-2. A manager, which is shown, for example, in Figure 1 by manager 20, in communication with the first host digital data processor, responds to a request on behalf of the first host digital data processor for extension of the file system by

assigning one or more further storage devices to the first host digital data processor based upon the lower capacity bound and the upper capacity bound, which is shown, for example, in Figure 1 and Figure 27 and Applicants' Specification, page 121, lines 6-9.

Also, claim 9 describes a storage area network (SAN) that includes one or more storage units, one or more host digital data processors coupled to the one or more storage units via an interconnect, and one or more agents, each executing on an associated host digital data processor and each in communication with a manager digital data processor, which is shown, for example, in Figure 1 by hosts 12a, 12b, 12c that are in communication with storage devices 14a, 14b, 14c via fabric interconnect 16. The one or more agents (where an agent is shown, for example, in Figure 4 by agent 24) each identify attributes of any of (i) the associated host digital data processor with which that agent is associated, (ii) the interconnect to which that associated host digital data processor is coupled, and (iii) storage units to which that associated host digital data processor is coupled, and communicate those attributes to the associated host digital data processor (where attributes are shown in, for example, Figures 16-17). The one or more agents each respond to assignment, by the manager digital data processor, of a storage unit to the associated host digital data processor(s) by preventing access by that associated host digital data processor to others of said storage units in the SAN. At least a selected one of the one or more host digital data processors has a file system that effects access to that storage device and is associated with a lower capacity bound divided by (s) and an upper capacity bound divided by (s) for storage devices added to extend the file system, where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system, wherein the lower capacity bound describes a minimum available storage capacity of the storage devices and the upper capacity bound describes a maximum available storage capacity of the storage devices, which is shown, for example, by Figures 1, 2 (by a RAID subsystem), and 27. The manager responds to a request from the agent associated with the selected host digital data processor for extension of the file system by assigning one or more further storage devices to the selected host digital data processor based upon the lower capacity bound and the upper capacity bound, which is shown, for example, by Figures 1 and 27.

Claim 15 describes extending a file system associated with a first host digital data processor connected to a storage area network (SAN), which is shown, for example, by Figure 1 by hosts 12a, 12b, 12c and the SAN. One or more storage devices are identified from a group of

storage devices accessible to the first host digital data processor, in response to a request from the first host digital data processor for file system extension, having a pre-defined storage type and having storage capacities in a range between a lower capacity bound divided by (s) and an upper capacity bound divided by (s), where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system, wherein the lower capacity bound describes a minimum available storage capacity of the storage devices and the upper capacity bound describes a maximum available storage capacity of the storage devices, which is shown, for example, by Figures 1, 2, and 27. At least one storage device is selected from the identified storage devices, having the maximum available storage capacity, which is shown, for example, by Figure 27. The selected storage device is assigned to the requesting first host digital data processor, which is shown, for example, by Figure 27. Also, the Specification, on page 121, lines 6-12, describes that in step 154 Figure 27, in step 154, the SAN manager identifies individual storage devices (LUNs), accessible to the host and otherwise available for assignment to it (e.g., in the manner described above), and, in the case of a host that utilizes a RAID file system with striping, the SAN manager identifies such storage devices where the range of available storage falls between the minimum divided by (s) and maximum divided by (s), where (s) is the number of stripes specified for that file system.

Although claims 20-24 were not objected to, Applicants will discuss these as well. Claims 20-24 describe extending a RAID file system, which includes, in part, determining a number of storage devices. In block 156 of Figure 27, a storage device is assigned to a host digital data processor (e.g., Applicants' Specification, page 121, lines 14-16), and it is indicated that selection and assignment may be made from among storage devices of specific type or characteristic (e.g., Applicants' Specification, page 121, lines 17-19). Also, Applicants' Specification from page 122, line 21 – page 125, line 1, describes assignment of multiple storage devices.

Claims 23 and 24 are objected to because of an informality. Applicants have amended claims 23 and 24 to overcome the objection.

Claims 1-14 were rejected under 35 U.S.C. 112, second paragraph.

Claim 1 has been amended to overcome the rejection.

As to claim 7, the Examiner submits that Applicant fails to teach what an interconnect fabric is. Applicants traverse. Applicants Specification describes an interconnect fabric as connecting a plurality of hosts with one or more storage devices. For example, the Specification describes switches or switch-like interfaces are on a network or interconnect fabric between the hosts and storage device (e.g., page 2, lines 15-16); switches or switch-like interfaces on the interconnect fabric define zones or regions in which certain hosts can access certain storage devices, but not other storage devices (page 14, lines 17-19); and, a plurality of hosts that are coupled with one or more storage devices via an interconnect fabric for purposes of storing and retrieving information (page 51, lines 3-5). Also, Figure 1 illustrates an interconnect fabric 16 (referred to as an interconnect fabric 16 on page 52, line 18).

Claim 9 has been amended to overcome the rejection.

Claims 1-3 are rejected under 35 U.S.C. 103(a) as being obvious over Hitz et al. (U.S. Patent No. 6,751,637 B1) in view of Row et al. (U.S. Patent No. 5,163,131). Applicants traverse.

Claim 1 describes at least a first host digital data processor of the one or more host digital data processors in communication access with at least a first one of the plurality of storage devices, the first host digital data processor having a file system that effects access to that storage device. The first host digital data processor is associated with a lower capacity bound and an upper capacity bound for storage devices added to extend the file system. The lower capacity bound describes a minimum available storage capacity of the storage devices and the upper capacity bound describes a maximum available storage capacity of the storage devices (e.g., Applicants' Specification, page 121, lines 1-2). A manager, in communication with the first host digital data processor, responds to a request on behalf of the first host digital data processor for extension of the file system by assigning one or more further storage devices to the first host digital data processor based upon the lower capacity bound and the upper capacity bound (e.g., Applicants' Specification, page 121, lines 6-9, Figure 27).

The Hitz patent describes a method for integrating a file system with a RAID array that exports information about the arrangement of data blocks in the RAID subsystem. (Abstract). The file system uses this information to optimize the location of blocks as they are written to the RAID system (Col. 3, lines 55-61). Figure 10 of the Hitz patent describes a computer 1010

coupled to a disk controller 1050, which is coupled to data disks 1022 to 1024 of RAID array 1030 (Col. 5, lines 2-9). The disks 1022-24 are data disks for storing data blocks (Col. 5, lines 16-17).

The Examiner submits that the claimed lower capacity bound and upper capacity bound for storage devices added to extend the file system is taught by disks 1022 and 1024. Applicants traverse. The lower capacity bound and upper capacity bound describe minimum and maximum storage capacities, respectively, and storage devices are assigned to the first host digital data processor based upon the lower capacity bound and the upper capacity bound. The mere description of multiple disks in the Hitz patent does not teach or suggest the claimed bounds.

Furthermore, the Hitz patent does not describe extending a file system. Claim 1 describes that a manager, in communication with the first host digital data processor, responds to a request on behalf of the first host digital data processor for extension of the file system by assigning one or more further storage devices to the first host digital data processor based upon the lower capacity bound and the upper capacity bound. There is no teaching in the Hitz patent of extending a file system by assigning one or more further storage devices.

The Examiner submits that the Hitz patent does not explicitly disclose the first host digital data processor having a file system that effects access to that storage device, but cites the Row patent as teaching this. The Row patent describes a file server architecture that includes a file controller unit (Abstract). Figure 2 of the Row patent illustrates file controllers 112a, 112b, which run the shared file system (Col. 10, line 45). The Row patent does not cure the defects of the Hitz patent. In particular, the Row patent does not teach or suggest the claimed lower capacity bound and upper capacity bound or extending a file system by assigning one or more further storage devices.

When combined, the Hitz and Row patents do not teach or suggest, for example, a lower capacity bound and upper capacity bound that describe minimum and maximum storage capacities, respectively, or that further storage devices are assigned to a first host digital data processor based upon the lower capacity bound and the upper capacity bound.

Dependent claims 2-3 incorporate the language of independent claim 1 and add additional novel elements. Therefore, dependent claims 2-3 are not taught or suggested by the Hitz or Row patents, either alone or in combination, for at least the same reasons as were discussed with respect to claim 1.

Additionally, claim 2 describes that manager identifies a storage device from among the plurality of *further* storage devices accessible to the first host digital data processor having a capacity in a range between the lower capacity bound divided by (s) and the upper capacity bound divided by (s), and assigns that storage device to the first host digital data processor, where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system. The Examiner submits that the selecting a disk (Figure 5, 510 of the Hitz patent) teaches identifying a storage device from among the plurality of *further* storage devices. Applicants traverse. The Hitz patent is not directed to and does not describe extending a file system by assigning further storage devices. Also, the Hitz patent does not describe the claimed bounds. The Examiner submits that the Hitz patent does not disclose having a capacity in a range between the lower capacity bound divided by (s) and the upper capacity bound divided by (s), and assigns that storage device to the first host digital data processor, where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system, but that it would have been obvious to modify Hitz to take the number of stripes in that file system in consideration and divide the lower and upper capacity bound by that number to identify a storage device. Applicants traverse. The Hitz patent does not take the claimed lower bound capacity and upper bound capacity into consideration when allocating storage devices and so it would not be obvious to use such bounds to take into consideration the number of stripes in the file system.

Claim 3 describes that the manager identifies one or more storage devices from among the plurality of further storage devices accessible to the first host digital data processor having capacities in a range between the lower capacity bound divided by (s) and the upper capacity bound divided by (s), and assigns to the first host digital data processor the storage device from among those so identified having the greatest capacity, where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system. Claim 3 is not taught or suggested by the Hitz patent or the Row patent, either alone or in combination, for the same reasons as were discussed with respect to claims 1 and 2.

Claim 4 is rejected under 35 U.S.C. 103(a) as being obvious over Hitz et al. (U.S. Patent No. 6,751,637 B1) in view of Row et al. (U.S. Patent No. 5,163,131), and in further view of Shimada et al. (U.S. Patent No. 6,832,299 B2). Applicants traverse.

Claim 4 describes that the manager assigns a plurality of storage devices having a combined storage capacity that equals or exceeds the lower capacity bound divided by (s) in the absence of identifying any storage device having a capacity in a range between the lower capacity bound and the upper capacity bound, where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system.

The Examiner submits that Hitz in view of Row does not explicitly disclose that the manager assigns a plurality of storage devices having a combined storage capacity that equals or exceeds the lower capacity bound divided by (s) in the absence of identifying any storage device having a capacity in a range between the lower capacity bound and the upper capacity bound, where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system, but submits that the Shimada patent discloses this. Applicants traverse.

The Shimada patent does not cure the defects of the Hitz and Row patents. In particular, the Shimada patent does not teach or suggest, for example, that a first host digital data processor is associated with a lower capacity bound and an upper capacity bound for storage devices added to extend the file system, where the lower capacity bound describes a minimum available storage capacity of the storage devices and the upper capacity bound describes a maximum available storage capacity of the storage devices. The Shimada patent also does not teach or suggest that a manager, in communication with the first host digital data processor, responds to a request on behalf of the first host digital data processor for extension of the file system by assigning one or more further storage devices to the first host digital data processor based upon the lower capacity bound and the upper capacity bound.

The Shimada patent describes that a table is provided that shows a correspondence between virtual logical units and logical units (Abstract). The table stores evaluation items of each storage device, such as a delay time and access frequency (Abstract). An evaluation unit calculates an evaluation value and a unitary logical unit of the storage is assigned according to the evaluation value. Additionally, the Shimada patent at Col. 5, lines 50-67 and Col. 6, lines 1-5 describes executing a storage assigning program, which assigns a logical unit having a highest evaluation value (Figure 14). This teaches away from assigning storage using the claimed bounds.

Therefore, claim 4 is not taught or suggested by the Hitz patent, the Row patent, or the Shimada patent, either alone or in combination.

Claims 5-8 are rejected under 35 U.S.C. 103(a) as being obvious over Hitz et al. (U.S. Patent No. 6,751,637 B1) in view of Row et al. (U.S. Patent No. 5,163,131), and in further view of "official notice". Applicants traverse.

Dependent claims 5-8 incorporate the language of independent claim 1 and add additional novel elements. Therefore, dependent claims 5-8 are not taught or suggested by the Hitz or Row patents, either alone or in combination, for at least the same reasons as were discussed with respect to claim 1.

Claim 9 is rejected under 35 U.S.C. 103(a) as being obvious over Shimada et al. (U.S. Patent No. 6,832,299 B2) in view of Morley et al. (U.S. Patent No. 6,507,890 B1). Applicants traverse.

Claim 9 describes a storage area network (SAN) that includes one or more storage units, one or more host digital data processors coupled to the one or more storage units via an interconnect, and one or more agents, each executing on an associated host digital data processor and each in communication with a manager digital data processor. The one or more agents each identify attributes of any of (i) the associated host digital data processor with which that agent is associated, (ii) the interconnect to which that associated host digital data processor is coupled, and (iii) storage units to which that associated host digital data processor is coupled, and communicate those attributes to the associated host digital data processor. The one or more agents each respond to assignment, by the manager digital data processor, of a storage unit to the associated host digital data processor(s) by preventing access by that associated host digital data processor to others of said storage units in the SAN. At least a selected one of the one or more host digital data processors has a file system that effects access to that storage device and is associated with a lower capacity bound divided by (s) and an upper capacity bound divided by (s) for storage devices added to extend the file system, where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system, wherein the lower capacity bound describes a minimum available storage capacity of the storage devices and the upper capacity bound describes a maximum available storage capacity of the storage devices.

The manager responds to a request from the agent associated with the selected host digital data processor for extension of the file system by assigning one or more further storage devices to the selected host digital data processor based upon the lower capacity bound and the upper capacity bound.

The Shimada patent at Col. 3, lines 11-27 describes virtual storage areas. Figure 3 describes a host computer that stores a file system 317, an FC-driver 319, a user policy determining program 321, a policy table 322, and a VLU-LU correspondence table 320 (Col. 3, lines 29-36, Figure 3). The items that are stored does not teach or suggest the claimed one or more agents each identifying attributes of any of (i) the associated host digital data processor with which that agent is associated, (ii) the interconnect to which that associated host digital data processor is coupled, and (iii) storage units to which that associated host digital data processor is coupled, and communicating those attributes to the associated host digital data processor.

The Shimada patent at Col. 3, lines 1-56 describes a host computer (Figure 3) and virtual storage areas, but there is no teaching that one or more agents each respond to assignment, by the manager digital data processor, of a storage unit to the associated host digital data processor(s) by preventing access by that associated host digital data processor to others of said storage units in the SAN.

The Shimada patent at Col. 5, lines 1-67 to Col. 6, lines 1-25 describes determining a user policy (Figures 5, 6, 7), example contents of a VLU-LU correspondence table (Figure 8), and processing to be executed by a storage assigning program (Figure 9). There is no description that a manager responds to a request from the agent associated with the selected host digital data processor for extension of the file system by assigning one or more further storage devices to the selected host digital data processor based upon the lower capacity bound and the upper capacity bound.

The Morley patent describes expanding a log structure in a disk array, where the disk array is being expanded from M-width to N-width, but this does not teach or suggest the subject matter of claim 9.

The Examiner submits that neither the Shimada patent nor the Morley patent explicitly teach at least a selected one of the one or more host digital data processors having a file system that effects access to that storage device and being associated with a lower capacity bound divided by (s) and an upper capacity bound divided by (s) for storage devices added to extend the

file system, where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system. Additionally, neither the Shimada patent nor the Morley patent describe that the lower capacity bound describes a minimum available storage capacity of the storage devices and the upper capacity bound describes a maximum available storage capacity of the storage devices. In fact, by teaching that a storage assigning program, assigns a logical unit having a highest evaluation value (Figure 14), the Shimada patent teaches away from assigning storage using the claimed bounds. The Examiner submits that the formula or relational phrase disclosed in the limitation are associated with finite number of devices, which has been disclosed by Morley. Applicants traverse. The Morley patent does not describe the claimed use of bounds. Therefore, neither the Shimada patent nor the Morley patent, either alone or in combination, teach or suggest the subject matter of claim 9.

Claim 10 is rejected under 35 U.S.C. 103(a) as being obvious over Shimada et al. (U.S. Patent No. 6,832,299 B2) in view of Morley et al. (U.S. Patent No. 6,507,890 B1), and in further view of Wang et al. (U.S. Patent No. 5,928,327). Applicants traverse.

Claim 10 describes that at least one of the host digital processors includes a software RAID file system having no stripes and number of mirror redundancies (m), and the manager extends the RAID system, in response to a file system extension request, by assigning a number of same-sized storage devices (n) to the requesting host in accord with a relation $n = m + 1$.

The Examiner submits that the Morley patent at Col. 6, lines 49-65 describes that the manager extends the RAID system, in response to a file system extension request, by assigning a number of same-sized storage devices (n) to the requesting host. Applicants traverse. The claimed invention is directed to extending a file system by assigning storage devices. On the other hand, the Morley patent at Col. 6, lines 49-65 describes free segments that are assigned to a disk or disk array. A free segment is not a storage device as claimed.

The Examiner submits that the Shimada patent in view of the Morley patent does not explicitly disclose assigning a number of same-sized storage devices to the requesting host in accord with a relation $n=m+1$ but that the Wang patent teaches this.

The Wang patent at Col. 14, lines 5-15 describes that storage threads are created for storage devices. The Wang patent at Col. 21, lines 30-67 describes that the system and method interleaves the storage of a data object onto N disks, where N can be as large as desired to gain

high performance by allowing a large number of parallel disk operations. On the other hand, the claimed subject matter is directed to extending a file system. The Wang patent at Col. 22, lines 1-27 describes that M is an integer between 1 and N-1, inclusive. However, the Wang patent does not use M and N to extend a file system by assigning a number of same-sized storage devices; instead, the Wang patent uses M and N to write data blocks to a video object (Col. 22, lines 28-61).

Therefore, neither the Shimada, nor the Morley, nor the Wang patents teach or suggest the subject matter of claim 10.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as being obvious over Shimada et al. (U.S. Patent No. 6,832,299 B2) in view of Morley et al. (U.S. Patent No. 6,507,890 B1), and in further view of Hitz et al. (U.S. Patent No. 6,751,637 B1). Applicants traverse.

As discussed above with respect to claims 1 and 9, the Shimada, Morley, and Hitz patents do not teach or suggest, for example, a lower capacity bound and upper capacity bound that describe minimum and maximum storage capacities, respectively, or that further storage devices are assigned to a first host digital data processor based upon the lower capacity bound and the upper capacity bound.

Dependent claims 11-14 incorporate the language of independent claim 9 and add additional novel elements. Dependent claims 11-14 are not taught or suggested by the Shimada, Morley, or Hitz patents, either alone or in combination, for at least the same reasons as were discussed with respect to claims 1 and 9.

Additionally, claims 13 and 14 assign a number of same-sized storage devices (n) to a requesting host in accord with the relations $n = s*(m+1)$ and $n = (m+1)*s$, respectively. The Examiner submits that none of the references disclose such assignment. The Examiner cites the Morley patent as describing expanding a disk from M-width to N-width and that it would have been obvious to use the claimed relations. Applicants traverse. The Morley patent at Col. 2, lines 52-65 describes that the size of one or more segments is enlarged from M-width to N-width. The Morley patent describes that the width of a segment approximates the width of a disk array (Col. 3, lines 61-62). Because the Morley patent approximates the width of the disk array, there is not need for use of the claimed relations, and the Morley patent teaches away from the

claimed relations. Also, there is no discussion in the Morley patent about determining a number of storage devices based on a number of mirror redundancies for each stripe.

Claims 15-18 and 21 are rejected under 35 U.S.C. 103(a) as being obvious over Morley et al. (U.S. Patent No. 6,507,890 B1) in view of Hitz et al. (U.S. Patent No. 6,751,637 B1), and in further view of Wang et al. (U.S. Patent No. 5,928,327). Applicants traverse.

The Examiner submits that the Morley and Hitz patens do not disclose identifying one or more storage devices from a group of storage devices accessible to the first host digital data processor, in response to a request from the first host digital data processor for file system extension, having a pre-defined storage type and having storage capacities in a range between a lower capacity bound divided by (s) and an upper capacity bound divided by (s), where (s) is one if the file system is not a striped RAID file system and, otherwise, is a number of stripes in that file system. The lower capacity bound describes a minimum available storage capacity of the storage devices and the upper capacity bound describes a maximum available storage capacity of the storage devices. The Examiner cites the Wang patent at Col. 4, lines 25-65 and Figure 8, item #801 and Figure 1A as teaching this element. Applicants traverse. Figure 1A of the Wang patent describes a video on demand system, while Figure 8, item #801 describes determining a storage device. Col. 4, lines 25-65 of the Wang patent describes an error recovery process that interleaves error recovery blocks computed for every M blocks with data blocks. The Wang patent is concerned with error recovery, not file system extension. The Wang patent does not teach or suggest the claimed subject matter.

Additionally, claim 15 describes selecting *from the identified storage devices* at least one storage device having a maximum storage capacity. The Hitz patent Figure 5 item #530 selects a disk, and Figure 10 item #1024 describes a disk. The Hitz patent does not describe selecting a storage device having a maximum capacity.

Thus, the Morley patent, the Hitz patent, and the Wang patent, either alone or in combination, do not teach or suggest the subject matter of claim 15.

Dependent claims 16-18 incorporate the language of independent claim 15 and add additional novel elements. Dependent claims 16-18 are not taught or suggested by Morley patent, the Hitz patent, and the Wang patent, either alone or in combination, for at least the same reasons as were discussed with respect to claim 15.

Claim 21 describes extending a RAID file system of a first digital processor connected to a storage area network (SAN), having a number of stripes (s) and no mirror dependencies, wherein extending the RAID file system assigns a certain number of storage devices to the first host digital data processor having access to the RAID file system, comprising determining a number (n) of same-sized storage devices to be assigned to the first host digital data processor in accord with a relation: n = s.

The Examiner submits that expanding a log structure in a disk array is read as extending a RAID file system. Applicants traverse. Extending a RAID file system refers to assigning a certain number of storage devices to a host having access to the RAID file system (e.g., Applicants' Specification, page 123, lines 13-17), rather than to expanding segments of a log structure. The Examiner submits that assigning segments is read as assigning storage devices. Applicants traverse. The segments the Morley patent at Col. 6, lines 49-65 describes free segments that are assigned to a disk or disk array. A free segment is not a storage device as claimed. The Morley patent describes that the width of a segment approximates the width of a disk array (Col. 3, lines 61-62), which teaches away from a segment being a storage device, as a storage device would not be the width of a disk array. The Examiner submits that Morley in view of Hitz does not disclose determining a number (n) of same-sized storage devices to be assigned to the first host digital data processor in accord with a relation: n = s, but that the Wang patent discloses this. Applicants traverse.

The Wang patent at Col. 14, lines 5-15 describes that storage threads are created for storage devices. The Wang patent at Col. 21, lines 30-67 describes that the system and method interleaves the storage of a data object onto N disks, where N can be as large as desired to gain high performance by allowing a large number of parallel disk operations. On the other hand, the claimed subject matter is directed to extending a file system. The Wang patent at Col. 22, lines 1-27 describes that M is an integer between 1 and N-1, inclusive. However, the Wang patent does not use M and N to extend a file system by assigning a number of same-sized storage devices; instead, the Wang patent uses M and N to write data blocks to a video object (Col. 22, lines 28-61).

Thus, the Morley patent, the Hitz patent, and the Wang patent, either alone or in combination, do not teach or suggest the subject matter of claim 21.

Claim 19 is rejected under 35 U.S.C. 103(a) as being obvious over Morley et al. (U.S. Patent No. 6,507,890 B1) in view of Hitz et al. (U.S. Patent No. 6,751,637 B1), and in further view of Wang et al. (U.S. Patent No. 5,928,327), and further in view of "Official Notice". Applicants traverse.

Dependent claim 19 incorporates the language of dependent claim 18 and independent claim 15 and adds additional novel elements. Dependent claim 19 is not taught or suggested by Morley patent, the Hitz patent, and the Wang patent, either alone or in combination, for at least the same reasons as were discussed with respect to claim 15.

Claims 20, 23, and 24 are rejected under 35 U.S.C. 103(a) as being obvious over Morley et al. (U.S. Patent No. 6,507,890 B1) in view of Wang et al. (U.S. Patent No. 5,928,327). Applicants traverse.

Claim 20 describes determining a number of same-sized storage devices to be assigned to a first host digital data processor to extend a software RAID file system of the first host digital data processor, wherein extending the software RAID file system assigns a certain number of the same-sized storage devices to the first host digital data processor having access to the RAID file system, comprising the step of determining a number of storage devices (n) for a RAID file system having no stripes and a number of mirror redundancies (m) in accord with a relation: $n = m + 1$.

The Examiner submits that expanding a log structure in a disk array is read as extending a RAID file system. Applicants traverse. Extending a RAID file system refers to assigning a certain number of storage devices to a host having access to the RAID file system (e.g., Applicants' Specification, page 123, lines 13-17), rather than to expanding segments of a log structure. The Examiner submits that assigning segments is read as assigning storage devices. Applicants traverse. The segments the Morley patent at Col. 6, lines 49-65 describes free segments that are assigned to a disk or disk array. A free segment is not a storage device as claimed. The Morley patent describes that the width of a segment approximates the width of a disk array (Col. 3, lines 61-62), which teaches away from a segment being a storage device, as a storage device would not be the width of a disk array.

The Examiner submits that Morley patent does not disclose determining a number of storage devices (n) for a RAID file system having no stripes and a number of mirror redundancies (m) in accord with a relation: n = m + 1, but that the Wang patent discloses this. Applicants traverse. The Wang patent at Col. 14, lines 5-15 describes that storage threads are created for storage devices. The Wang patent at Col. 21, lines 30-67 describes that the system and method interleaves the storage of a data object onto N disks, where N can be as large as desired to gain high performance by allowing a large number of parallel disk operations. On the other hand, the claimed subject matter is directed to extending a file system. The Wang patent at Col. 22, lines 1-27 describes that M is an integer between 1 and N-1, inclusive. However, the Wang patent does not use M and N to extend a file system by assigning a number of same-sized storage devices in accord with a relation n = m + 1; instead, the Wang patent uses M and N to write data blocks to a video object (Col. 22, lines 28-61).

Claim 23 describes extending a RAID file system of a first digital processor connected to a storage area network (SAN), wherein extending the RAID file system assigns a certain number of storage devices to the first host digital data processor having access to the RAID file system, comprising determining a number of storage devices (n) for a RAID file system having a number of mirror redundancies (m) for each strip (s) in accord with a relation: n = s*(m +1), wherein * is a multiplication symbol.

The Examiner submits that expanding a log structure in a disk array is read as extending a RAID file system. Applicants traverse. Extending a RAID file system refers to assigning a certain number of storage devices to a host having access to the RAID file system (e.g., Applicants' Specification, page 123, lines 13-17), rather than to expanding segments of a log structure or merely adding disks to storage arrays (Morley, Figure 12, #1200).

The Examiner submits that the Morley and Wang patents do not explicitly disclose determining a number of storage devices (n) for a RAID file system having a number of mirror redundancies (m) for each strip (s) in accord with a relation: n = s*(m +1), wherein * is a multiplication symbol, but that it would have been obvious to do so. Applicants traverse. The Morley patent describes expanding a log structure in a disk array, where the disk array is being expanded from M-width to N-width. The Wang patent at Col. 21, lines 30-67 describes that the system and method interleaves the storage of a data object onto N disks, where N can be as large as desired to gain high performance by allowing a large number of parallel disk operations.

Neither the Morley nor the Wang patents are directed to extending a RAID file system by assigning a certain number of storage devices to a host having access to the RAID file system in accord with a relation: n = s*(m +1).

Claim 24 describes extending a RAID file system of a first digital processor connected to a storage area network (SAN), wherein extending the RAID file system assigns a certain number of storage devices to the first host digital data processor having access to the RAID file system, comprising determining a number of storage devices (n) for a RAID file system having a number of stripes (s) for each mirror redundancy (m) in accord with a relation: n = (m+1)*s, wherein * is a multiplication symbol.

The Examiner submits that expanding a log structure in a disk array is read as extending a RAID file system. Applicants traverse. Extending a RAID file system refers to assigning a certain number of storage devices to a host having access to the RAID file system (e.g., Applicants' Specification, page 123, lines 13-17), rather than to expanding segments of a log structure or merely adding disks to storage arrays (Morley, Figure 12, #1200).

The Examiner submits that the Morley and Wang patents do not explicitly disclose determining a number of storage devices (n) for a RAID file system having a number of stripes (s) for each mirror redundancy (m) in accord with a relation: n = (m+1)*s, wherein * is a multiplication symbol, but that it would have been obvious to do so. Applicants traverse. The Morley patent describes expanding a log structure in a disk array, where the disk array is being expanded from M-width to N-width. The Wang patent at Col. 21, lines 30-67 describes that the system and method interleaves the storage of a data object onto N disks, where N can be as large as desired to gain high performance by allowing a large number of parallel disk operations. Neither the Morley nor the Wang patents are directed to extending a RAID file system by assigning a certain number of storage devices to a host having access to the RAID file system in accord with a relation: n = (m+1)*s.

Thus, the Morley and Wang patents, either alone or in combination, do not teach or suggest the subject matter of claims 20, 23, and 24.

Claim 22 is rejected under 35 U.S.C. 103(a) as being obvious over Morley et al. (U.S. Patent No. 6,507,890 B1) in view of Hitz et al. (U.S. Patent No. 6,751,637 B1). Applicants traverse.

Claim 22 describes extending a RAID file system of a first digital processor connected to a storage area network (SAN), wherein extending the RAID file system assigns a certain number of storage devices to the first host digital data processor having access to the RAID file system comprising determining a number of storage devices (n) for RAID file system having no mirror redundancies and a number of stripes (s) greater than two in accord with a relation: $n = s$.

The Examiner submits that expanding a log structure in a disk array is read as extending a RAID file system. Applicants traverse. Extending a RAID file system refers to assigning a certain number of storage devices to a host having access to the RAID file system (e.g., Applicants' Specification, page 123, lines 13-17), rather than to expanding segments of a log structure. The Examiner submits that the Morley patent does not disclose determining a number of storage devices (n) for RAID file system having no mirror redundancies and a number of stripes (s) greater than two in accord with a relation: $n = s$, but that the Hitz patent discloses this.

The Hitz patent discloses integrating a file system with a RAID array that exports information about the arrangement of data blocks in the RAID subsystem (Abstract). The Hitz patent at Col. 2, lines 10-30 describes striping, and a strip is a group of data blocks that are each stored on separate disks. However, there is no teaching or suggestion in the Hitz patent to extend a RAID file system by assigning a certain number of storage devices to a host having access to the RAID file system in accord with a relation: $n=s$.

Thus, the Morley and Hitz patents, either alone or in combination, do not teach or suggest the subject matter of claim 22.

New claim 25 is not taught or suggested by the references, for example, for the same reasons as were discussed with respect to claim 15.

## Conclusion

For all the above reasons, Applicants submit that the pending claims 1-25 are patentable over the art of record. Applicants have not added any claims. Nonetheless, should any additional fees be required, please charge Deposit Account No. 09-0466.

The attorney of record invites the Examiner to contact her at (310) 553-7973 if the Examiner believes such contact would advance the prosecution of the case.

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By: Janaki K. Davda

Janaki K. Davda
Registration No. 40,684

Please direct all correspondences to:

David Victor
Konrad Raynes & Victor, LLP
315 South Beverly Drive, Ste. 210
Beverly Hills, CA 90212
Tel: 310-553-7977
Fax: 310-556-7984